

## **Air Dispersion Modeling Summary for Permit No. 7482M1**

**Report Date:** 2/7/2020

**NMED/AQB Modeler:** Angela Raso

### **Facility Identification:**

Project: 3Bear Libby Gas Plant Company: 3 Bear Delaware Operating – NM, LLC

Permit number: 7482M1 TEMPO ID: 38067

### **Location Information:**

The facility is located 15.5 miles west-southwest of Monument, in Lea County. The facility is located 20.7 miles west-northwest of Eunice.

UTM Coordinates: 638,430 m East, 3,601,510 m North, zone 13, Datum: NAD83

Elevation = 3713 feet

Air Quality Control Region (AQCR): 155

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### **Project Description:**

**Brief:** 3 Bear Delaware Operating – NM, LLC has applied to the New Mexico Air Quality Bureau for a Revision to New Source Review air quality permit 7482 for the modification of the 3Bear Libby Gas Plant facility (the facility). The facility is a gas plant. The modification of the facility includes the addition of compressor engines to up to 7 engines and increasing the volume of flared gas.

The following types of emission sources are included in the project: Hot Oil Heater, Inlet Compressor Engine, Upset/Maintenance Flare, Amine Regenerator Heater, Residue Gas Compressor Engine, Tank Flare, and Thermal Oxidizer. The emission units are described in Table 1: Table of Emissions and Stack Parameters, below.

For this permit, modeling was required for the following pollutants: Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Particulate Matter 10 micrometers or less in aerodynamic diameter (PM<sub>10</sub>), Particulate Matter (2.5 microns or less) (PM<sub>2.5</sub>), and Sulfur Dioxide (SO<sub>2</sub>).

**Table 1: Table of Maximum Total Facility Emissions**

NO <sub>2</sub> Rate (lbs/hr)	CO Rate (lbs/hr)	SO <sub>2</sub> Rate (lbs/hr)	PM <sub>10</sub> Rate (lbs/hr)	PM <sub>2.5</sub> Rate (lbs/hr)
287.85	1,174.63	121.95	11.25	8.39

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**Table 2: Table of Point Sources<sup>1</sup>**

Stack Number	Description	Stack Ht. (ft)	Dia. (ft)	Vel. (ft/s)	Temp. (°F)	NO <sub>2</sub> Rate (lbs/hr)	CO Rate (lbs/hr)	SO <sub>2</sub> Rate (lbs/hr)	PM <sub>10</sub> Rate (lbs/hr)	PM <sub>2.5</sub> Rate (lbs/hr)
ENG1	Inlet Compressor	15.0	0.8	136.1	931	1.520	3.040	0.020	0.060	0.060
ENG2	Inlet Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG3	Inlet Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG4	Inlet Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG5	Residue Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG6	Residue Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG7	Residue Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG8	Residue Compressor	25.0	1.0	193.7	992	3.043	2.373	0.032	0.114	0.114
ENG9	Residue Compressor	25.0	1.5	77.8	1,179	1.900	1.570	0.040	0.260	0.260
ENG10	Residue Compressor	25.0	1.5	77.8	1,179	1.900	1.570	0.040	0.260	0.260
ENG11	Residue Compressor	25.0	1.5	77.8	1,179	1.900	1.570	0.040	0.260	0.260
ENG12	Residue Compressor	25.0	1.5	77.8	1,179	1.900	1.570	0.040	0.260	0.260
HTR1	Hot Oil Heater	30.0	3.0	12.6	664	2.420	4.070	0.140	0.370	0.370
HTR2	Regen Gas Heater	12.0	2.0	8.2	500	1.080	0.910	0.030	0.080	0.080
TO1	Thermal Oxidizer	50.0	4.7	15.0	1,400	1.560	1.310	64.449	0	0
FL1	Upset/Maintenance Flare	100.0	9.3	65.6	1,832	251.596	1,146.981	57.085	6.246	6.246
FL2	Tank Flare	30.0	2.5	65.6	1,832	0.892	4.068	0	0.002	0.002

**Table 4: Table of Volume Sources<sup>1</sup>**

Source ID	Description	Release Height (ft)	Horizontal Dimension (ft)	Vertical Dimension (ft)	PM10 Rate (lbs/hr)	PM2.5 Rate (lbs/hr)
HR1	Haul Road	11.2	20.8	10.4	0.037	0.004

<sup>1</sup> All values copied or converted from 3Bear Libby Gas Plant Permit Application.

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### **Modeling Assumptions:**

This application includes engine options.

Option1: ENG1, ENG3, ENG4, ENG5, ENG6, ENG7, ENG8

Option2: ENG2, ENG3, ENG4, ENG5, ENG6, ENG7, ENG8

Option3: ENG1, ENG3, ENG4, ENG9, ENG10, ENG11, ENG12

Option4: ENG2, ENG3, ENG4, ENG9, ENG10, ENG11, ENG12

### **Permit Conditions:**

The permittee will only be allowed to operate engines in the combinations described above.

### **Conclusion:**

This modeling analysis demonstrates that operation of the facility described in this report neither causes nor contributes to any exceedances of applicable air quality standards. The standards relevant at this facility are New Mexico Ambient Air Quality Standards (NMAAQS) and National Ambient Air Quality Standards (NAAQS) for CO, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub>; and Class II PSD increments for NO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and SO<sub>2</sub>.

**Action:** The permit can be issued based on this modeling analysis.

Modeling report submitted by Trent M. Wade (dated 9/13/2019)

Modeling was last revised on 12/5/2019.

The air quality analysis demonstrates compliance with applicable regulatory requirements.

Model(s) Used: AERMOD was used to run the modeling analysis.

**Note:** Complete modeling input and output files can be made available and are located in the Modeling Archives in the folder, "7482M1\_3Bear Libby Gas Plant".

**Number of Model Runs:** AERMOD - 8 modeling runs were run by NMED to confirm applicant results. NMED conducted 5 modeling runs to confirm significant impact analysis (one for each pollutant), 3 modeling runs to confirm impact with surrounding sources (for PM<sub>2.5</sub>, PM<sub>10</sub>, and SO<sub>2</sub>).

### **Modeling Parameters:**

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The AERMOD regulatory default parameters were included in assumptions made by the model.

Building downwash produced by buildings at the facility was considered. The following buildings were included in the modeling.

**Table 5: Table of Buildings**

Building Name	Height (m)	Diagonal Length (m)
AMINECON	15.2	0.9
AMINESTL	21.3	1.1
CONDTWR	18.3	1.2
CSV	4.9	24.7
DEMETH	33.5	1.5
ENG-2	4.6	7.3
ENG-3	4.6	7.3
ENG-4	4.6	7.3
ENG-5	4.6	7.3
ENG-6	4.6	7.3
ENG-7	4.6	7.3
ENG-8	4.6	7.3
HTR-1	3.0	15.9
HTR-2	3.0	9.6
IA	3.0	8.2
MAIN	4.9	17.8
MCC	4.9	19.3
OFFICE	3.7	22.0
SLUG1	1.8	137.3
SLUG2	1.8	137.3
TK-1	6.1	3.7
TK-2	6.1	3.7
TK-3	6.1	3.7
TK-4	6.1	3.7
TK-5	6.1	3.7
TK-6	6.1	3.7

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TK-7	6.1	3.7
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### **Complex Terrain Data:**

Both simple and complex types of terrain were used to model the facility. Elevations of receptors, facility sources, and surrounding sources were obtained from digitized USGS 1/3 arc degree maps.

**Receptor Grid:** The following grids were used to determine the maximum concentration for each pollutant.

**Table 4: Table of Receptors**

Grid Type	Description	Shape	Spacing	Radius or Length
Cartesian	Rough	Square	1000 meters	10 kilometers
Cartesian	Intermediate	Square	500 meters	10 kilometers
Cartesian	Intermediate	Square	250 meters	4 kilometers
Cartesian	Fine	Square	100 meters	2 kilometers
Cartesian	Very fine	Square	50 meters	1 kilometers
Fence line	Very fine	Fence line	50 meters	Fence line

Receptors outside of the radii of impact were discarded for the surrounding source runs.

**Meteorological Data:** AERMOD – HOBBS\_Artesia-NWS\_Midland-ua\_2015.SFC.

### **Adjacent Sources:**

The Division's Modeling Guidance was used to select 110 sources within 50 km of the facility.

The facility is 2.0 km from Targa - Lea Compressor Station. The facility is 2.2 km from Plains - Lynch 176 Station. The facility is 2.8 km from Lynch Booster Station. The facility is 21.4 km from Targa - Monument Gas Plant. The facility is 21.6 km from Monument Compressor Station. The facility is 22.7 km from DCP - Eunice Gas Plant.

### **PSD Increment Information:**

The facility is a minor source (for PSD purposes) located in AQCR 155. The minor source baseline dates here are 3/16/1988 for NO<sub>2</sub>, 7/28/1978 for SO<sub>2</sub>, 2/20/1979 for PM<sub>10</sub>, and 11/13/2013 for PM<sub>2.5</sub>.

The facility is 88.7 km from the Class I area Carlsbad Caverns National Park. Class I area impacts are negligible for minor sources over 50 km from a Class I area. Modeling is not required.

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### **CO Analysis:**

The 1-hour CO concentration ( $1004.7 \mu\text{g}/\text{m}^3$ ) was below the significance level. No cumulative analysis is required.

The 8-hour CO concentration ( $336.7 \mu\text{g}/\text{m}^3$ ) was below the significance level. No cumulative analysis is required.

### **NO<sub>2</sub> Analysis:**

ARM2 was used with default options (0.5 minimum ratio, 0.9 maximum ratio) to determine the conversion of NO<sub>x</sub> to NO<sub>2</sub>.

Compliance with 1-hour NO<sub>2</sub> NAAQS automatically demonstrates compliance with air quality standards of other periods.

The maximum source alone 1-hour NO<sub>2</sub> concentration was  $87.8 \mu\text{g}/\text{m}^3$ . This was 46.7% of the NAAQS. A background concentration of  $64.2 \mu\text{g}/\text{m}^3$  was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson Street. The maximum total 1-hour NO<sub>2</sub> concentration was  $152.0 \mu\text{g}/\text{m}^3$ . This was 80.8% of the NAAQS.

The maximum source alone annual NO<sub>2</sub> concentration was  $6.6 \mu\text{g}/\text{m}^3$ . This was 7.0% of the NMAAQS. A background concentration of  $8.1 \mu\text{g}/\text{m}^3$  was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson Street. The maximum total annual NO<sub>2</sub> concentration was  $14.7 \mu\text{g}/\text{m}^3$ . This was 15.7% of the NMAAQS.

The maximum total annual NO<sub>2</sub> concentration was  $14.723 \mu\text{g}/\text{m}^3$ . This was 58.9% of the PSD Class II increment.

### **PM<sub>2.5</sub> Analysis:**

The maximum source alone 24-hour PM<sub>2.5</sub> concentration was  $2.2 \mu\text{g}/\text{m}^3$ . This was 6.2% of the NAAQS. The maximum 24-hour PM<sub>2.5</sub> concentration with surrounding sources was  $2.2 \mu\text{g}/\text{m}^3$ . A background concentration of  $13.4 \mu\text{g}/\text{m}^3$  was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total 24-hour PM<sub>2.5</sub> concentration  $15.6 \mu\text{g}/\text{m}^3$ . This was 44.5% of the NAAQS.

The maximum source alone annual PM<sub>2.5</sub> concentration was  $0.49 \mu\text{g}/\text{m}^3$ . This was 4.1% of the NAAQS. The maximum annual PM<sub>2.5</sub> concentration with surrounding sources was  $0.49 \mu\text{g}/\text{m}^3$ . A background concentration of  $5.9 \mu\text{g}/\text{m}^3$  was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total annual PM<sub>2.5</sub> concentration was  $6.4 \mu\text{g}/\text{m}^3$ . This was 53.3% of the NAAQS.

The maximum 24-hour PM<sub>2.5</sub> concentration with increment consuming sources was  $3.8 \mu\text{g}/\text{m}^3$ . This was 41.7% of the PSD Class II increment.

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The maximum annual PM<sub>2.5</sub> concentration with increment consuming surrounding sources was 0.49 µg/m<sup>3</sup>. This was 12.3% of the PSD Class II increment.

### **PM<sub>10</sub> Analysis:**

The 24-hour PM<sub>10</sub> concentration (4.9 µg/m<sup>3</sup>) was below the significance level. No cumulative analysis is required.

The maximum source alone annual PM<sub>10</sub> concentration was 1.5 µg/m<sup>3</sup>. This was 8.7% of the PSD Class II increment. The maximum annual PM<sub>10</sub> concentration with surrounding sources was 1.5 µg/m<sup>3</sup>. This was 8.7% of the PSD Class II increment.

### **SO<sub>2</sub> Analysis:**

Compliance with 1-hour SO<sub>2</sub> NAAQS automatically demonstrates compliance with air quality standards of other periods.

The maximum source alone 1-hour SO<sub>2</sub> concentration was 170.1 µg/m<sup>3</sup>. This was 86.6% of the NAAQS. The maximum 1-hour SO<sub>2</sub> concentration with surrounding sources was 170.3 µg/m<sup>3</sup>. This was 86.7% of the NAAQS.

The maximum source alone 3-hour SO<sub>2</sub> concentration was 157.5 µg/m<sup>3</sup>. This was 30.8% of the PSD Class II increment. The maximum total 3-hour SO<sub>2</sub> concentration with increment consuming surrounding sources was 157.6 µg/m<sup>3</sup>. This was 30.8% of the PSD Class II increment.

The maximum source alone 24-hour SO<sub>2</sub> concentration was 61.2 µg/m<sup>3</sup>. This was 67.3% of the PSD Class II increment. The maximum 24-hour SO<sub>2</sub> concentration with surrounding sources was 61.3 µg/m<sup>3</sup>. This was 67.4% of the PSD Class II increment.

The maximum source alone annual SO<sub>2</sub> concentration was 5.9 µg/m<sup>3</sup>. This was 29.3% of the PSD Class II increment. The maximum annual SO<sub>2</sub> concentration with surrounding sources was 6.1 µg/m<sup>3</sup>. This was 30.8% of the PSD Class II increment.

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**Table 5: Table of Ambient Impact from Emissions**

Pollutant, Time Period, and Standard	Facility Concentration ( $\mu\text{g}/\text{m}^3$ )	Modeled Concentration with Surrounding Sources ( $\mu\text{g}/\text{m}^3$ )	Background Concentration ( $\mu\text{g}/\text{m}^3$ )	Cumulative Concentration ( $\mu\text{g}/\text{m}^3$ )	Value of Standard ( $\mu\text{g}/\text{m}^3$ )	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
CO 1-Hr Sig. Level	1004.7	-	-	1004.7	2000.	50.2	638,300	3,601,100	3721
CO 8-Hr Sig. Level	336.7	-	-	336.7	500.	67.3	638,300	3,601,100	3721
NO <sub>2</sub> 1-Hr NAAQS	87.8	-	64.2	152.0	188.03	80.8	638,500	3,601,150	3717
NO <sub>2</sub> annual NMAAQs	6.6	-	8.1	14.7	94.02	15.7	638,410	3,601,238	3721
NO <sub>2</sub> annual PSD Class II increment	6.6	-	8.1	14.7	25	58.9	638,410	3,601,238	3721
PM <sub>2.5</sub> 24-Hr NAAQS	2.2	2.2	13.4	15.6	35	44.5	638,400	3,601,150	3719
PM <sub>2.5</sub> annual NAAQS	0.49	0.49	5.9	6.4	12	53.3	638,647	3,601,388	3721
PM <sub>2.5</sub> 24-Hr PSD Class II increment	3.8	3.8	-	3.8	9	41.7	638,450	3,601,150	3718
PM <sub>2.5</sub> annual PSD Class II increment	0.49	0.49	-	0.49	4	12.3	638,647	3,601,388	3721
PM <sub>10</sub> 24-Hr Sig. Level	4.9	-	-	4.9	5.0	98.0	638,647	3,601,338	3721
PM <sub>10</sub> annual PSD Class II increment	1.5	1.5	-	1.5	17	8.8	638,647	3,601,338	3721
SO <sub>2</sub> 1-Hr NAAQS	170.1	170.3	-	170.3	196.4	86.7	638,450	3,601,200	3717
SO <sub>2</sub> 3-Hr PSD Class II increment	157.5	157.6	-	157.6	512	30.8	638,350	3,601,200	3719
SO <sub>2</sub> 24-Hr PSD Class II increment	61.2	61.3	-	61.3	91	67.4	638,350	3,601,200	3719
SO <sub>2</sub> annual PSD Class II increment	5.9	6.1	-	6.1	20	30.8	638,647	3,601,488	3721